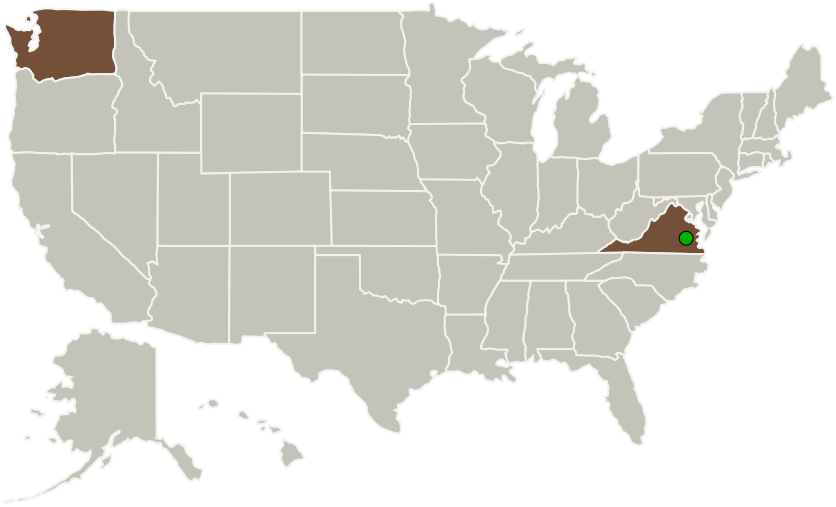
TRUSSELATOR - On-Orbit Fabrication of High Performance Support Structures for Solar Arrays, Phase I

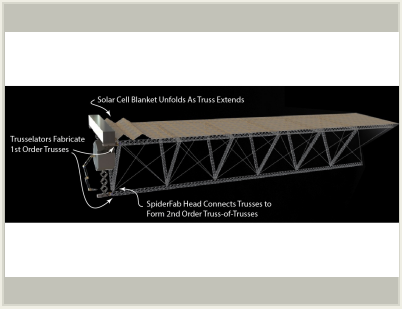
Completed Technology Project (2013 - 2013)

Project Introduction

TUI proposes to develop and demonstrate a process for fabricating high-performance composite truss structures on-orbit and integrating them with thin film solar cell assemblies to enable the deployment of very large solar arrays with lower cost and increased power-per-mass than SOA array technologies. On-orbit fabrication enables order-of-magnitude improvements in packing efficiency compared to state of the art deployables technologies such as coilable booms, deployable masts, and inflatable structures, and also enables geometric optimizations to provide order-of-magnitude improvements in structural performance. The proposed effort will build upon an existing TRL-3 truss-fabrication mechanism design, called the "Trusselator", which adapts techniques used in 3D printing and automated fiber placement to fabricate arbitrarily-long composite trusses using compactly-wound spools of textile materials as a feedstock. The Phase I SBIR effort will evolve this design to enable fabrication of high-performance truss structures using space-worthy materials, and develop methods for integrating these truss structures with solar cell blankets and the necessary wiring. The Phase II effort will prepare an advanced prototype and mature it to TRL-5 through environmental testing in the lab, preparing it for orbital validation testing in follow-on efforts.

Primary U.S. Work Locations and Key Partners





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Completed Technology Project (2013 - 2013)

Organizations Performing Work	Role	Type	Location
Tethers Unlimited Inc	Lead Organization	Industry	
Langley Research Center(LaRC)	Supporting Organization	NASA Center	Hampton, Virginia

Primary U.S. Work Locations	
Virginia	Washington

Project Transitions

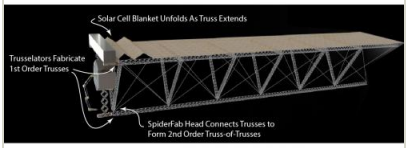
May 2013: Project Start

November 2013: Closed out

Closeout Documentation:

- Final Summary Chart*(https://techport.nasa.gov/file/138547)*

Images



Project Image
TRUSSELATOR - On-Orbit Fabrication of High Performance Support Structures for Solar Arrays *(https://techport.nasa.gov/image/128981)*

Organizational Responsibility

Responsible Mission Directorate:
Space Technology Mission Directorate (STMD)

Lead Organization:
Tethers Unlimited Inc

Responsible Program:
Small Business Innovation Research/Small Business Tech Transfer

Project Management

Program Director:
Jason L Kessler

Program Manager:
Carlos Torrez

Principal Investigator:
Robert P Hoyt

Co-Investigator:
Robert Hoyt

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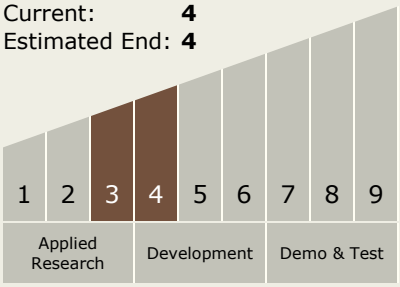
Completed Technology Project (2013 - 2013)

Technology Maturity (TRL)

Start: **3**
Current: **4**
Estimated End: **4**



Technology Areas

Primary:

- TX12 Materials, Structures, Mechanical Systems, and Manufacturing
  - TX12.2 Structures
    - TX12.2.5 Innovative, Multifunctional Concepts

Target Destinations

The Sun, Earth, The Moon, Mars, Others Inside the Solar System, Outside the Solar System